Running title: Loss of smell web search during COVID-19 outbreak

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Title: The Use of Google Trends to investigate the loss of smell related searches during COVID-19 outbreak

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We have no conflict of interest to declare

Abstract

Background

Initial reports describing COVID-19 were dominated by the presence of cough, breathlessness, and fever, anecdotal reports suggested anosmia may also be a manifestation. We sought to use Google Trends (GT) to investigate whether there was a surge in individuals searching for information related

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to smell loss during the COVID-19 epidemic in the Italy, Spain, UK, USA, Germany, France, Iran and Netherlands.

Methods

GT was used to explore Internet activity related to loss of smell in Italy, Spain, UK, USA, Germany, France, Iran and Netherlands. Spearman rank analysis was performed to correlate loss of smell relative search volumes (RSV) with the increases of daily confirmed cases of COVID-19 and deaths attributed to disease. As a control event, we also performed analysis of smell-related searches during the last UK Influenza epidemic of 2009.

Results

In all three countries, we observed strong correlations between daily RSVs related to loss of smell, increases of daily COVID-19+ cases and deaths ranging from 0.633 to 0.952. All correlations were statistically significant ($p<0.05$).

Conclusion

There is a strong correlation between the frequency of searches for smell-related information and the onset of COVID-19 infection in Italy, Spain, UK, USA, Germany, France, Iran and Netherlands. We would hypothesise this may relate to a previously under-recognised symptom.

Keywords: Google Trends, COVID-19, Loss of Smell, Symptom variation, Coronavirus

Introduction

Healthcare systems across the world are been strained to the limit by Coronavirus. Emanating from Hubei province, COVID-19 has spread globally with devastating consequences. Public health responses have been hamstrung by the limited information available on the typical presentation and symptomology of the virus; each new piece of information must be fitted into a jigsaw puzzle when we cannot see the larger picture.

One of the first articles published from the COVID-19 outbreak described the neurological sequelae of infection [1]. The authors performed a retrospective case review of 214 patients admitted to hospital in Wuhan and identified that 6% had "hyposmia" charted as a symptom at admission. Given that hyposmia is an item often overlooked during standard medical history taking, this is not an insignificant proportion of patients who volunteered the change in smell perception as a symptom. However, initial reports were dominated by the more dramatic symptoms of fever, cough, and breathlessness and these symptoms remain the guidance for the UK government advice that should prompt self-isolation [2].

However, as cases became more prevalent across the globe there were anecdotal reports of social media chatter regarding a sudden increase in anosmia in otherwise well patients. Rhinologists reported seeing a sudden increase in anosmic patients without nasal blockage, running, fever, cough, or any other symptoms that would be used to justify self-isolation. The coincidental timing with the COVID-19 pandemic leads naturally to the hypothesis – could a loss in the sense of smell be a symptom of Coronavirus infection?

A fast-moving pandemic requires equally agile research techniques using real-time data collection. The power of Google Trends (GT) as an epidemiological surveillance tool has been demonstrated in previous studies of Influenza[3] and specifically in rhinology[4] . We sought to harness GT to investigate

trends in searches regarding smell and anosmia and to track these search engine terms against the Coronavirus outbreak in the Italy, Spain, UK, USA, Germany, France, Iran and Netherlands.

Materials and methods

Google Trends (GT), an online tracking system of Internet hit-search volumes that recently merged with its sister project Google Insights for Search (Google Inc.), was used to explore Internet activity related to the COVID19 epidemic. The portal determines the proportion of searches for user-specified terms among all searches performed using Google. It then provides a relative search volume (RSV), which is the query share of a particular term for a given location and time period, normalised by the highest query share of that term over the time series and presented on a scale from 0 to 100. Each point of the graph generated by GT is divided by the highest point, which is conventionally set at 100.

The following terms were used: “smell”, “loss of smell”, “anosmia”, “hyposmia”, “olfaction”, “taste”, “loss of taste”, “dysguesia” (disease, topic and term). This process was repeated with manual translation of the above search terms into Spanish, Italian, Persian, German, French and Dutch. In Spanish, the term “olfato” was the primary term used, in Italian “olfatto”, in Persian “بویی یا بو”, in German “Geruchsverlust”, in French “anosmie” and in Dutch “reuk”. GT will automatically translate disease and topic searches, and thus the process was repeated with “anosmia”. “hyposmia”, and “dysgeusia”. In the UK, German and USA, the search term “loss of smell” demonstrated the most responsive variation in the specified study time. By comparison, the manual translation of the simple term “smell” into Spanish, Dutch, Persian and Italian (respectively “olfato”, “بویی یا بو”, “reuk” and “olfatto”) offered better results than the translations of “loss of smell”. Thus, “olfato”, “بویی یا بو”, “reuk” and “olfatto” were selected for further analysis only in Spain, Netherlands, Iran and Italy.

Unfortunately, it was not possible to analyse search trends from China due of restrictions in the country that limit the access[5].

Estimations of the incidence of coronavirus has been hampered by limited availability and reliability of testing. This has led to concerns that confirmed case numbers vastly underestimating the reservoir of disease present in a population. Testing has generally been reserved for the most severe cases, and as such we also used deaths confirmed secondary to coronavirus as a proxy for disease prevalence within a country and plotted the frequency of smell-related search terms to the number of coronavirus deaths in each country. Information regarding coronavirus cases and deaths for the Italy, Spain, UK, USA, Germany, France, Iran and Netherlands was gathered from the official government and CDC website [6-9].

We examined smell-related search terms from 1st December 2019 to 25th March 2020 for the terms identified above in the Italy, Spain, UK, USA, Germany, France, Iran and Netherlands. We then plotted the trajectories of these search term trends against the number of cases and deaths related to Coronavirus identified in each country. The data was examined graphically and then tested formally by Kolgomorov-Smirnov test. This confirmed the data was not normally distributed, and therefore Spearman's rank correlation was used to test the strength of the association between the RSVs for loss of smell and the number of cases of Coronavirus and the number of deaths attributed to Coronavirus in Spain, Italy, and the UK. GT also demonstrates RSVs by location and can offer data at a regional level. To illustrate the utility of this function we chose Spain as the test country due to its rapidly increasing numbers of cases. We then plotted the number of smell-related search terms by region in Spain.

To our knowledge, the first formal note of anosmia as likely symptom of COVID19 was the BRS report from Professor Hopkins (20/3/2020) [10]. To investigate this potential confounding effect of publicity, we restricted our GT analysis to the time period ending on 19th March and re-tested the relationship in the UK, Spain and Italy [11].

We wanted to determine dates of statistically significant increase of RSV linear trends prior to COVID-19 outbreak. We analysed a period between 1st of January and 25th of March 2020 and

plotted the trajectories of RSVs of each country. We performed the linear regression and found no statistically significant trend between 1st of February and 1st of March 2020 for Italy, Spain, UK, USA, Germany, France and Netherlands. In case of Iran, we found no statistically significant trend between 1st of January and 1st of February 2020. We identified means from this period and set the 95% confidence level (upper bound) as a threshold for significant trend.

Subsequently, we analysed following period ending on 25th of March per country and identified the day when RSV trajectory gained a significant trend. Significance was confirmed by linear regression.

We sought to test our hypothesis using the last recorded epidemic in the UK, caused by Swine Flu by H1N1 in 2009. There is no reported association between anosmia and H1N1 and as such we wanted to use this epidemic as a control to the current coronavirus pandemic. We analysed a period between 27th of April and 3rd of July 2009 when Health Protection Agency announced that containment approach to reduce spread is no longer appropriate, and would be replaced by a treatment phase in which everybody presenting symptoms would be treated if necessary without laboratory confirmation. Daily reports of confirmed cases are no longer being published [12,13].

Moreover since several studies have shown that post viral olfactory loss occurs in general peaks in March, we analysed a matching period (Italy, Spain and UK) in 2019 and performed a correlation analysis [14-16].

Computation was done using SPSS software v21.0.0 (IBM Corporation, Armonk, NY, US).

Results

Using the search terms appropriate to each country, trajectories for the frequency of smell-related search items were examined from 1st of February to 25th March 2020. From January 1st until January 31st the frequency of smell related search terms did not significantly deviate from the baseline values for each country. Figure 1 shows cumulative RSVs between 25th of February and 25th of March 2020.

We therefore narrowed our analysis to the ten-day time period specifically preceding the first coronavirus death within each country which occurred on 5th March in the UK, 21st February in Italy, 4th March in Spain, 29th of February in USA, 9th of March in Germany , 25th of February in France, 19th of February in Iran and 6th of March in the Netherlands. Dates of statistically significant increase of RSV linear trends where on 7th of March (Italy), 13th of March (Spain), 13th of March (UK), Iran 24th of February (Iran), 18th of March (USA), 15th of March (Germany), 17th of March (France) and 19th of March (Netherlands). The trajectories representing daily increase of cases, deaths and RSVs for each country in these time frames is illustrated in Figure 2.

The strength of the association between daily increase of cases, deaths and RSVs were then tested with Spearman rank correlation. We observed strong correlations ranging from 0.633 to 0.952. All correlations were statistically significant ($p<0.001$) (Tab 1.).

Then, we investigated potential confounding effect of BRS statement. Spearman Rank correlation analysis for daily increase of cases, deaths and RSVs was restricted to the time period ending on 19th March. Analysis showed again strong correlations for Spain, Italy and UK ranging from 0.836 to 0.936 ($p<0.001$) and no difference when compared to correlations of the ten-day time period preceding the first coronavirus death within each country to 25th of March 2020.

We then tested the correlation of smell-related search terms with a previous epidemic of Swine Flu secondary to H1N1 between 27th of April and 3rd of July 2009. This relationship is illustrated in figure 2. No correlation was observed between daily increase of H1N1 positive cases and RSVs. We also compared RSVs of current COVID-19 outbreak with a matching period in 2019 for each country. We did not observe similar trend as well as no correlation was identified (Fig 4.).

Finally, to analyse the GT output offering “hotspots” of search items at regional level we identified the region of Spain with the highest frequency of smell-related search items and re-tested the

relationship. Spearman correlation analysis between daily increase of COVID19+ cases and RSV on single day (20/3/2020) revealed strong correlation (0.91, $p<0.001$). This data is illustrated in Fig 5.

Discussion

These data illustrate a clear correlation between the use of search terms regarding "smell" and the number of coronavirus cases and deaths. This correlation is present across Italy, Spain, UK, USA, Germany, France, Iran and Netherlands and is remarkably consistent in temporal relationship to the outbreak in each country when monitored against the first death secondary to coronavirus. This suggests that there may indeed be an increase in frequency in members of the public searching for information regarding their sense of smell in the same timeframe as Coronavirus has manifested in their country. Given that anosmia has been identified in at least 6% of coronavirus patients, this could either represent an enormous reservoir of disease within each country; a larger proportion of Coronavirus patients suffering anosmia; or yet undetected coincidental factor confounding results. Given the strength and consistency of the correlation we would favour an association with coronavirus and smell but acknowledge the limitations in the data (discussed below).

We have also tried to be pragmatic with this study, and in particular to be flexible in the chosen search terms. Direct translation of a term from one language to another can result in lost nuances of meaning and overlay, and thus we tried to select terms which were responsive to the coronavirus pandemic. It is worth noting here that this is not to say that there was no relationship when using other terms – e.g. "anosmia" instead of "smell" but the smaller number of searches using infrequently used search terms leads to a small sample size and difficulty in detection of trends. Ultimately, the inference of this study is to detect local trends and spikes in search strings that may alert epidemiologists to infection hotspots and tailoring of search terms to local phraseology would be more likely to detect change than a rigid "one size fits all" translation.

Our hypothesis would be that members of the public have identified that they have had a change in their sense of smell and have been compelled to search for information, and may have (rightly or wrongly) made the link of causality with coronavirus due to its dominance of the international news agenda. This seems to be a phenomenon particular to coronavirus, and we failed to find a similar pattern in the most recent epidemic recorded in the UK and caused by Swine Flu. Taking these findings together, we would hypothesise that this may represent a subset of the population who have suffered anosmia in association with coronavirus infection or carriage. Taking this hypothesis one step further, one could infer that the Google Trend data could be monitored in real time to detect occurrence of symptoms that have been hitherto unrecognised as a disease manifestation. In the context of a global pandemic, this offers a tantalising glimpse of the opportunity to use a tool such as Google Trends to monitor a broad spectrum of physical symptom search terms and home in on spikes of activity. These could be used to identify not only symptoms that should be further investigated for association with disease; but also could identify a subset of the population who are well other than a minor symptom that is sufficiently irritating to prompt the sufferer to search for information but insufficiently serious to seek medical attention. In short, it could be used to identify a population with minor symptoms or asymptomatic carriage who would never have come to the attention of traditional healthcare channels. Whilst this is merely a hypothesis, it is a potential tool to identify reservoirs of infection within a population and to take real time action to contain it.

However, big data such as that collected by GT must be interpreted with a degree of caution as it is not possible to accurately define the population who contributes to the data sample. Sudden increases in searches can be driven by the news agenda, for example there was a spike in searches around thunderstorm asthma in 2016 [17] when it was highlighted in several news pieces. One cannot be certain if an individual is searching for information due to suffering the symptom, or through curiosity.

At the time of writing the ENTUK statement (March 20th, 2020), the author had searched the published literature and social media, but was surprised by the paucity of reports connecting COVID-19 infection and anosmia outside of closed physician discussion boards, at least in English language based sites. At that time, anosmia was not recognised as a potential symptom by the WHO, any national diagnostic criteria or widely promoted symptom trackers, which was one of the major drivers to issue a press release. We performed another search for purposes of this article and identified only one Iranian report on loss of sense of smell coinciding with COVID-19 epidemic among Iranians dated on 9th of March 2020 [18]. There is undoubtedly an increase in the days following the ENT-UK press release, the AAO-HNS statement which followed on the 22 March, as the International press reported a potential 'new symptom of COVID infection[19]. Therefore, correlations were repeated using data up to March 19th

In this regard, it is likely that many of the searches performed in the UK after March 20th were in part driven by the inclusion in the mainstream media of the BRS report from Professor Hopkins regarding anosmia in Coronavirus [10]. To investigate this potential confounding effect of publicity in driving Google searches, we restricted our analysis to the time period ending on 19th March and re-tested the relationship in the UK. The correlation coefficient for case incidence on re-testing remained similar in all three countries. Similarly, trends in Spain and Italy pre-date this press release which is, to our understanding, the first time that a formal note of the association was published in mainstream media regarding a potential link between COVID-19 and anosmia.

The second important confounder is a well described seasonal variation in post viral olfactory loss related to upper respiratory tract infections. Several studies have shown that post viral olfactory loss occurs in general peaks in March [14-16]. We compared RSVs of current COVID-19 outbreak with a matching period in 2019 and analysis did not reveal a similar trend.

Equally, any data analysis based on RSV must acknowledge the inherent bias that it is a population sample selected specifically from the literate, with sufficient income to access the internet, and whose chosen search engine is Google.

Conclusions

There is a strong correlation between the frequency of searches for smell-related information and the onset of COVID-19 infection in Italy, Spain, UK, USA, Germany, France, Iran and Netherlands. Despite all our efforts to control confounders, findings of this study must be interpreted with a degree of caution. It is difficult to define the population that contributes to the data sample and sudden increase in searches can be driven by the news agenda. Therefore, findings of this study need validation from epidemiological studies analysing rates of anosmia in COVID-19+ positive patients but support the call from ENT-UK and the AAO-HNSF to include anosmia in the list of possible symptoms.

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Tables

Table 1.: Spearman rank correlation analysis for daily increases in COVID-19+ cases, deaths, smell searches

		Italy			Spain			UK			IRAN		
		Cases	Deaths	RSV	Cases	Deaths	RSV	Cases	Deaths	RSV	Cases	Deaths	RSV
Italy	Cases	1	.982**	.831**	.982**	.982**	.947**	.976**	.961**	.906**	.976**	.981**	.835**
	p-value		p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001
	Deaths	.982**	1	.833**	.957**	.977**	.941**	.949**	.974**	.882**	.982**	.990**	.844**
	p-value	p<0.001		p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001
	RSV	.831**	.833**	1	.655**	.596**	.559**	.607**	.558**	.518**	.865**	.859**	.782**
	p-value	p<0.001	p<0.001		p<0.001	p<0.001	.001	p<0.001	.001	.003	p<0.001	p<0.001	p<0.001
Spain	Cases	.982**	.957**	.655**	1	.976**	.952**	.973**	.950**	.864**	.950**	.962**	.611**
	p-value	p<0.001	p<0.001	p<0.001		p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001
	Deaths	**.982****	**.977****	.596**	.976**	1	.936**	.967**	.968**	.891**	.964**	.975**	.650**
	p-value	p<0.001	p<0.001	p<0.001	p<0.001		p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001
	RSV	.947**	.941**	.559**	**.952****	**.936****	1	.926**	.935**	.850**	.907**	.924**	.582**
	p-value	p<0.001	p<0.001	.001	p<0.001	p<0.001		p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001
UK	Cases	.976**	.949**	.607**	.973**	.967**	.926**	1	.942**	.861**	.943**	.950**	.591**
	p-value	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001		p<0.001	p<0.001	p<0.001	p<0.001	p<0.001
	Deaths	.961**	.974**	.558**	.950**	.968**	.935**	.942**	1	.871**	.929**	.962**	.588**
	p-value	p<0.001	p<0.001	.001	p<0.001	p<0.001	p<0.001	p<0.001		p<0.001	p<0.001	p<0.001	.001
	RSV	.906**	.882**	.518**	.864**	.891**	.850**	**.861****	**.871****	1	.885**	.897**	.538**
	p-value	p<0.001	p<0.001	.003	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001		p<0.001	p<0.001	.002
IRAN	Cases	.976**	.982**	.865**	.950**	.964**	.907**	.943**	.929**	.885**	1	.965**	.878**
	p-value	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001		p<0.001	p<0.001
	Deaths	.981**	.990**	.859**	.962**	.975**	.924**	.950**	.962**	.897**	.965**	1	.899**
	p-value	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001		p<0.001
	RSV	.835**	.844**	.782**	.611**	.650**	.582**	.591**	.588**	.538**	**.878****	**.899****	1
	p-value	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	.001	.002	p<0.001	p<0.001	

		USA			Germany			France			Netherlands		
		Cases	Deaths	RSV	Cases	Deaths	RSV	Cases	Deaths	RSV	Cases	Deaths	RSV
USA	Cases	1	.960**	.636**	.885**	.798**	.784**	.969**	.886**	.680**	.871**	.909**	.659**
	p-value		p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001
	Deaths	.960**	1	.633**	.975**	.823**	.836**	.984**	.933**	.721**	.927**	.979**	.723**
	p-value	p<0.001		p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001
	RSV	**.636****	**.633****	1	.092	.059	.025	.646**	.690**	.550**	.423*	.391*	.233
	p-value	p<0.001	p<0.001		.647	.771	.903	p<0.001	p<0.001	.001	.020	.033	.215
Germany	Cases	.885**	.975**	.092	1	.829**	.836**	.947**	.817**	.426*	.874**	.975**	.565**
	p-value	p<0.001	p<0.001	.647		p<0.001	p<0.001	p<0.001	p<0.001	.027	p<0.001	p<0.001	.002
	Deaths	.798**	.823**	.059	.829**	1	.663**	.823**	.820**	.151	.818**	.817**	.487**
	p-value	p<0.001	p<0.001	.771	p<0.001		p<0.001	p<0.001	p<0.001	.452	p<0.001	p<0.001	.010
	RSV	.784**	.836**	.025	**.836****	**.663****	1	.833**	.713**	.458*	.774**	.810**	.565**

	p-value	p<0.001	p<0.001	.903	p<0.001	p<0.001		p<0.001	p<0.001	.016	p<0.001	p<0.001	.002
France	Cases	.969**	.984**	.646**	.947**	.823**	.833**	1	.948**	.768**	.918**	.957**	.715**
	p-value	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001		p<0.001	p<0.001	p<0.001	p<0.001	p<0.001
	Deaths	.886**	.933**	.690**	.817**	.820**	.713**	.948**	1	.726**	.933**	.883**	.677**
	p-value	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001		p<0.001	p<0.001	p<0.001	p<0.001
	RSV	.680**	.721**	.550**	.426*	.151	.458*	**.768****	**.726****	1	.342	.479**	.272
	p-value	p<0.001	p<0.001	.001	.027	.452	.016	p<0.001	p<0.001		.064	.007	.146
Netherlands	Cases	.871**	.927**	.423*	.874**	.818**	.774**	.918**	.933**	.342	1	.925**	.693**
	p-value	p<0.001	p<0.001	.020	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	.064		p<0.001	p<0.001
	Deaths	.909**	.979**	.391*	.975**	.817**	.810**	.957**	.883**	.479**	.925**	1	.676**
	p-value	p<0.001	p<0.001	.033	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	.007	p<0.001		p<0.001
	RSV	.659**	.723**	.233	.565**	.487**	.565**	.715**	.677**	.272	**.693****	**.676****	1
	p-value	p<0.001	p<0.001	.215	.002	.010	.002	p<0.001	p<0.001	.146	p<0.001	p<0.001	

Cases = daily increases of COVID-19+ cases
Deaths = daily increases of confirmed deaths secondary to COVID-19+
RSV = relative search volumes
**Correlation is significant at the 0.01 level (2-tailed).
*Correlation is significant at the 0.05 level (2-tailed).

Figure 1: Cumulative trends of RSVs in Italy, Spain and UK between 25th of February and 25th of March 2020

RSV = Relative search volume

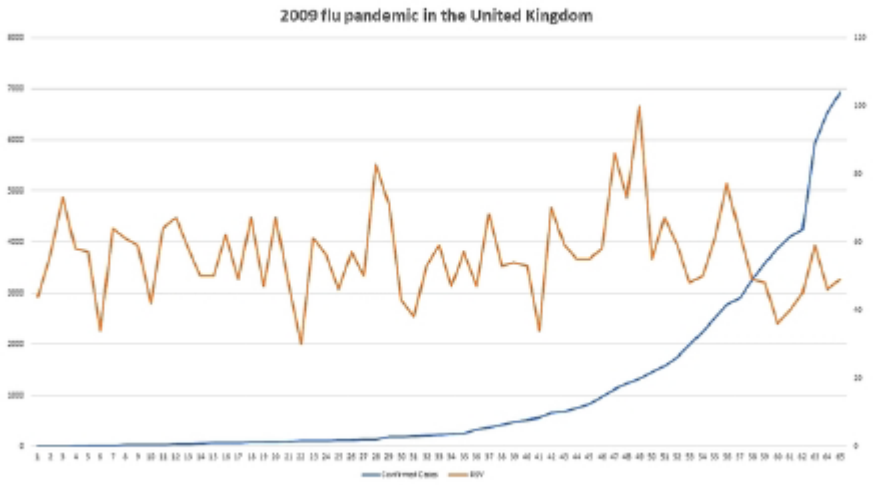

Figure 2: Daily increases of COVID-19+ cases, deaths and RSVs trajectories for Italy, Spain, UK, USA, Germany, France, Iran and Netherlands.

Italy:

Day 1 = 11th of February 2020 (10 days prior to first death)

Day 44 = 25th of March 2020

Spain:

Day 1 = 23rd of February 2020 (10 days prior to first death)

Day 31 = 25th of March 2020

United Kingdom:

Day 1 = 24th of February 2020 (10 days prior to first death)

Day 30 = 25th of March 2020

Iran:

Day 1 = 9th of February 2020 (10 days prior to first death)

Day 46 = 25th of March 2020

USA:

Day 1 = 19th of February 2020 (10 days prior to first death)

Day 36 = 25th of March 2020

Germany:

Day 1 = 28th of February 2020 (10 days prior to first death)

Day 27 = 25th of March 2020

France:

Day 1 = 15th of February 2020 (10 days prior to first death)

Day 40 = 25th of March 2020

Netherlands:

Day 1 = 25th of February 2020 (10 days prior to first death)

Day 30 = 25th of March 2020

Daily increase = Daily increases of COVID-19+ cases

Daily deaths = Daily increases of confirmed deaths secondary to COVID-19+

RSV = Relative search volume

Figure 3: Daily increase of flu positive cases and RSV trajectories for UK.

Day 1 = 27/4/2009

Day 32 = 2/7/2009 (Testing of flu discontinued next day)

Figure 4: Comparison of RSV trend during current COVID-19 outbreak and matching period in 2019.

Italy:

Day 1 = 11th of February

Day 44 = 25th of March

Spain:

Day 1 = 23rd of February

Day 31 = 25th of March

United Kingdom:

Day 1 = 24th of February

Day 30 = 25th of March

RSV = Relative search volume

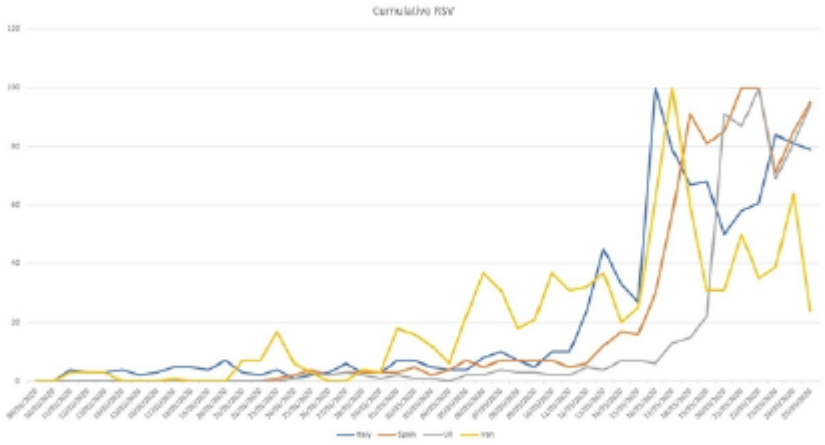

Figure 5: Heatmap of Spain showing the new cases of COVID-19+ cases (left) and RSV (right) on 20/3/2020